DECLARATION

I, Atsushi Yasuno, of Yanagida & Associates, 7F Shin-Yokohama KS Bldg., 3-18-3 Shin-Yokohama, Kohoku-ku, Yokohama-shi, Japan, hereby certify that I understand both the English and Japanese languages, that the attached is a true and correct translation of the priority document to the best of my belief, and that all statements are being made with the knowledge that willful false statements and the like are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Atsushi Yasuno

Dated this 19th day of March, 2007

[Name of Document] Specification

[Title of Invention] Method, Apparatus, and Storage Medium for Recording Images

[Scope of Demand for Patent]

[Claim 1]

An image recording method for recording a plurality of sets of image data on a storage medium, comprising the steps of:

selecting representative images of the images represented by said plurality of sets of image data, and

attaching thumbnail images of said representative images to the surface of said storage medium.

[Claim 2]

An image recording method as defined in Claim 1, wherein:

said representative images are selected based on predetermined data attached to said plurality of sets of image data.

[Claim 3]

An image recording method as defined in either one of Claims 1 or 2, wherein:

said representative images are selected based on the degree of similarity of said plurality of sets of image data.

[Claim 4]

An image recording apparatus for recording a plurality of sets of image data on a storage medium, comprising:

a selecting means for selecting representative images representative of the images represented by said plurality of sets of image data, and

a representative image attaching means for attaching thumbnail images of said selected representative images to the surface of said storage medium.

[Claim 5]

An image recording apparatus as defined in Claim 4, wherein said selecting means selects said representative images based on predetermined data attached to said plurality of sets of image data.

[Claim 6]

An image recording apparatus as defined in either one of Claims 4 or 5, wherein said selecting means selects said representative images based on the degree of similarity of said plurality of sets of image data.

[Claim 7]

A computer readable storage medium, in which a program is recorded, that causes a computer to execute a recording method for recording a plurality of sets of image data onto a storage medium, comprising:

a selecting procedure for selecting representative images representative of the images represented by said plurality of sets of image data, and

an attaching procedure for attaching thumbnail images of said representative images to the surface of said storage medium.

[Claim 8]

A computer readable storage medium as defined in Claim 7, wherein

said selecting procedure selects said representative images based on predetermined data attached to said plurality of sets of image data.

[Claim 9]

A computer readable storage medium as defined in either one of Claims 7 or 8, wherein

said selecting procedure selects said representative images based on the degree of similarity of said plurality of sets of image data.

[Claim 10]

A storage medium for recording a plurality of sets of image data, wherein index images of the representative images of the images represented by said plurality of sets of image data are attached to the surface of the storage medium.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a method and an apparatus for recording a plurality of sets of image data onto a recording medium, such as a CD-R, and to a storage medium for recording

a program capable of causing a computer to execute the recording method according to the present invention.

[0002]

[Conventional Technology]

Services are currently offered wherein image data obtained by digitizing users' photographs, or image data obtained by photography with a digital camera, etc. is recorded onto storage media, such as CD-R's, DVD-R's and the like. In these types of services, by use of a specialized viewer recorded on the storage medium or a viewer in the possession of the user, the images recorded on the storage medium can be viewed on a computer. In addition, in these services, when image data is recorded on a storage medium, an index print is created at the same time and provided to the user in a package with the storage medium. Here, a common ID number is recorded on both the surface of the recording medium and the index print. Therefore, by referring to the ID number, the type of image data recorded on the storage medium disk can be confirmed by referring to the corresponding index print.

[0003]

[Problem to be Solved by the Invention]

However, if the index print is misplaced, a user cannot know what kind of images are recorded on the storage medium without loading the storage medium disk into a computer and accessing the images stored on thereon via the viewer. Therefore, a problem arises that under such circumstances it is extremely time consuming to find a desired image. In this situation, a user could

request the service provider to reprint the index print. However, printing costs would be incurred, and the burden on the user is high.

[0004]

The present invention has been developed in consideration of the circumstances described above, and it is a main objective of the present invention to provide an image recording method and an image recording apparatus in which it is easy to confirm the content of the images recorded on the storage medium, and a computer readable medium for recording a program that causes a computer to execute the image recording method according to the present invention.

[0005]

[Means for Solving the Problem]

An image recording method of the present invention, in which a plurality of sets of image data are recorded on a storage medium, is characterized by: a representative image being selected from among the images represented by the plurality of sets of image data; and a thumbnail image of the selected image being attached to the surface of the storage medium.

[0006]

Here, the "representative image" may be any image which is representative of the images represented by the plurality of sets of image data recorded on the storage medium. A single representative image may be selected, or a plurality of representative images may be selected. In the present invention,

all of the images represented by the image data recorded on the storage medium may be the "represented image".

[0007]

In addition, the expression "attached to the surface of the storage medium" refers not only to a thumbnail image of a representative image being directly printed onto the surface of the storage medium. The expression "attached to the surface of the storage medium" may also refer to adhesively attaching a representative image printed out as a sticker, etc. onto the surface of the storage medium, or any other method providing for recognition of the representative images on the surface of the storage medium. Note that offset and screen-printing methods can be used as the method for printing thumbnail images onto the surface of the storage medium. Alternatively, a method such as that disclosed in Japanese Unexamined Patent Publication No. 5(1993)-212857, wherein a toner image is formed by applying toner to a latent image formed on a photosensitive drum by a laser beam, which is then transferred to a transfer drum by repetition of the transfer process employing a number of printing colors, whereby a full-color toner image is formed on the transfer drum and then transferred to the surface of the storage medium, can also be used. As a further alternative, a method such as that described in Japanese Unexamined Patent Publication No. 10(1998)-100495, wherein a half cut process is applied to a heat-transfer sheet after thumbnail images have been printed

thereon by a heat-transfer method, can be used as a method of printing thumbnail image stickers.

[0008]

Note that in the image recording method of the present invention, it is preferable that the representative image be selected based on predetermined data attached to aforementioned plurality of sets of image data.

[0009]

Here, the expression "predetermined data" can refer to, for example: information related to the date on which the image was obtained, because it is possible to attach data related to the date on which an image was obtained; or data related to GPS, because it is possible to attach information related to GPS for images obtained by use of a camera equipped with a GPS function. In addition, depending on the camera, because it is possible to attach data related to the degree of importance of an image, data related to the degree of importance of an image may be used as the predetermined data.

[0010]

In addition, it is preferable for the representative image to be selected based on the degree of similarity of aforementioned plurality of sets of image data.

[0011]

An image recording apparatus for recording a plurality of sets of image data on a storage medium according to the present invention is characterized by comprising: a selecting means for

selecting a representative image representative of the images represented by aforementioned plurality of sets of image data, and a representative image attaching means for attaching a thumbnail image of a selected representative image to the surface of the storage medium.

[0012]

Note that in the image recording apparatus of the present invention, it is preferable that aforementioned selecting means select the representative image based on the predetermined data.

[0013]

In addition, in the image recording apparatus of the present invention, it is preferable for the aforementioned selecting means to select the representative image based on the degree of similarity of the plurality of sets of image data.

[0014]

An image storage medium for recording some or all of plurality of sets of image data of the present invention is characterized by: an index image representative of the images represented by the plurality of sets of image data being attached to the surface thereof.

[0015]

Note that the image recording method according to the present invention may be provided as a program recorded on a computer readable medium that causes a computer to execute said image recording method.

[0016]

[Advantageous Effects of the Invention]

According to the present invention, because a thumbnail image representative of the images represented by the plurality of sets of image data recorded on a storage medium is attached to the surface thereof, by looking at the surface of the surface of the storage medium, the content recorded thereon can be ascertained. Accordingly, even if there is no index print, the amount of time and effort required when searching for a desired image can be reduced, because it is becomes unnecessary to load the storage medium in a computer and view the images recorded thereon by use of a viewer in order to confirm the content (images) recorded on the storage medium.

[0017]

[Embodiments of the Invention]

Hereinafter, a preferred embodiment of the present invention will be explained with reference to the drawings.

[0018]

Fig. 1 is a schematic block drawing of an image recording system implementing the image recording apparatus according to a first preferred embodiment of the present invention. As shown in Fig. 1, the image recording system according to the first embodiment comprises a data obtaining means 1 for obtaining image data S0 obtained by photoelectrically reading out images recorded on film or for reading out plurality of sets of image data S0 from a digital camera or digital video camera recording medium; an image processing means 2 for obtaining a processed image data

S1 of each image data S0; an image recording means 3 for recording a plurality of sets of image data S1 on a storage medium 7 such as a FD, Zip, Smart Media, Memory Stick, CD-R, DVD-R, etc.; a representative image selecting means 4 for selecting an image representative of the images represented by the plurality of sets of image data S1; and a representative image attaching means 5 for attaching to a thumbnail image of the representative image selected by the representative image selecting means 4 to a surface 8 of a storage medium 7. Note that the present embodiment will be described in terms of reading out image data S0 from a digital camera or digital video camera recording medium.

[0019]

The image processing means 2 performs predetermined image processing, such as density correction processing, white-balance adjustment processing, gradation correction processing, sharpness processing, pixel number correction processing, blemish and dust mark removal processing, trimming processing, etc., to the image data S0 to obtain the processed image data S1.

[0020]

The representative image selecting means 4 selects a representative image of the images represented by the plurality of sets of image data S1. Note that in the present embodiment, three representative images will be selected. Here, in the present embodiment, the image data S0 is obtained from a digital camera data storage medium or the like, and information related to the

date on which the image data S0 was obtained is attached thereto. Accordingly, the information related to the date on which the image data S0 was obtained is also attached to the image data S1, and a representative image is selected by the representative image selecting means 4 based on this data related to the date on which the image data S0 was obtained. Fig. 2 is a drawing provided to explain selection of a representative image based upon data related to the date on which image data S0 was obtained. For example, the graph in Fig. 2 shows the distribution of the relationship between time and number of images per day, among a course of several days, during which 20 images were obtained, and another day, during which 4 images were obtained. The representative image selecting means 4 selects 3 representative images from among the 24 images. For a case in which the distribution of the times at which the images were obtained is that shown in Fig. 2, the number of images in each distribution is considered, and 2 representative images are selected from the first date group and 1 representative image is selected from the later date group. This selection process is carried out in a random manner. Note that for cases in which the date on which images were obtained are substantially concentrated in the same period, or for cases in which the date distribution is random, 3 images are selected at random from all of the images.

[0021]

Further, currently there are digital cameras available that are equipped with a GPS function, and when image data S0 has been

obtained with such a digital camera, GPS data, that is, data related to the place at which the image data was obtained, is attached thereto. That is to say, for a case in which 20 images have been obtained at one location and 4 images at another, in the same way as for cases in which aforementioned date data is attached to the images, 2 representative images can be selected from images obtained at one location and 1 representative image from the other. In addition, for cases in which the images were primarily obtained at one location or the locations at which the images were obtained are random, 3 representative images can be selected at random from all of the images.

[0022]

Still further, there are digital cameras with which it is possible to attach data related to the degree of importance of an image at the time that images are obtained. In this type of case, an evaluation as to whether or not data related to the degree of importance of an image has been attached or not is conducted, and images to which degree of importance data has been attached can be selected as the representative images. Note that for cases in which there are more than 3 images to which degree of importance data has been attached, three images can be selected therefrom at random, and for cases in which there are less than 3 images to which degree of importance data has been attached, representative images can be selected at random from the other images.

[0023]

Further still, representative images can be selected corresponding to the degree of similarity of images. More specifically, histograms of the image data S1 are formed as quantifications of the characteristics thereof, and the degree of similarity is determined based on whether the form, that is, the distribution of data, of these histograms are similar. For example, as shown in Fig. 3, histograms H1 and H2 are similar, however, histogram H1 and histogram H3 are not similar. Accordingly, the images from which histograms H1 and H2 have been obtained are similar, however, the images from which histograms H1 and H3 have been obtained are not similar. In this manner, sets of image data S1 are grouped based upon the degree of similarity between images, and 1 image can be selected from each group as a representative image. Note that for cases in which there are more than three groups, a representative image is selected from each group, and from among the selected representative images, three representative images can be selected at random. In addition, for cases in which there are less than 3 images, more than 1 image is selected from the group or groups, and three images can be selected therefrom at random.

[0024]

Note that representative images can be selected from all the images in a random manner, without the use of date-obtained information or the like.

[0025]

The representative image attaching means 5 attaches 3 thumbnail images 9 to the surface 8 of the storage medium 7. More specifically, for cases in which surface 8 of storage medium 7 has been subjected to a matting process and printing is possible thereon, thumbnail images 9 of the representative images are printed thereon by use of an inkjet printer. In addition, thumbnail images 9 can also be attached by use of offset or screen-printing. As a further alternative, a transfer method as described in Japanese Unexamined Patent Publication No. 5(1993)-212857, wherein toner is applied to a latent image of a thumbnail image 9 formed, by use of a laser beam, on the surface of a photosensitive drum to form a toner image, and a full-color toner image of said toner image is formed on the surface of a transfer drum by repeated performance of the transfer process, employing a number of printing colors, and said toner image formed on the surface of the transfer drum is transferred to the surface 8 of the storage medium 7, can also be used.

[0026]

In addition, the representative image attaching means 5 can also be a means for affixing stickers, on which thumbnail images 9 of representative images have been printed, to the surface 8 of the storage medium 7. Here, a method such as that described in Japanese Unexamined Patent Publication No. 10(1998)-100495, wherein thumbnail images printed onto a heat-transfer sheet by a heat-transfer method, after which half-cut processing is

performed, can be employed as the method for carrying out printing of the stickers.

[0027]

Next, the operation of the present embodiment will be explained. Fig. 4 is a flowchart of the operation of the first embodiment. First, the data obtaining means 1 obtains image data S0 from the storage medium of a digital camera or the like (Step S1). The image processing means 2 obtains processed image data S1, which are the plurality of sets of obtained image data S0 after undergoing predetermined image processes (Step S2). Image data S1 are recorded onto the storage medium 7 by the image recording means 3 (Step S3). Meanwhile, the image data S1 are input to the representative image selecting means 4 and representative images of the images represented by the image data S1 are selected (Step 4). Note that the process of Step S4 can be carried out before or at the same time as the process of Step S3. Then, the representative image attaching means 5 attaches thumbnail images 9 of the representative images to the surface 8 of the storage medium 7, and the process ends. In this manner, three thumbnail images of the representative images of image data S1 recorded on the storage medium 7 are attached to the surface thereof, as shown in Fig. 1.

[0028]

In this manner, in the present embodiment, because the thumbnail images 9 of the representative images of the image data S1 recorded on the storage medium 7 are attached to the surface

8 thereof, by simply looking at the storage medium 7, the content of the images stored thereon can be confirmed. Accordingly, even if there is no index print of the images recorded on the storage medium 7, the amount of time and effort required when searching for a desired image can be reduced, because it is becomes unnecessary to load storage medium 7 in a computer and view the images recorded thereon by use of a viewer in order to confirm the content (images) recorded thereon.

[0029]

Note that in the embodiment described above, a case has been described in which image data read out from a digital camera or digital video camera storage medium was recorded on the storage medium 7. However, the present invention can also be applied to cases in which image data is obtained by reading out images recorded on film and recorded on the storage medium 7. In this case, the representative image selecting means 4 can randomly select representative images from the images recorded on film. For cases in which a date is included in the images recorded on film, data related to the date and time at which the images were obtained is obtained from the portion in which the date is recorded, and the representative images can be selected based on the date-obtained data, in the same manner as in the embodiment described above. In addition, representative images can also be selected based on the degree of similarity between images.

[0030]

In addition, for cases in which so-called APS film, which is capable of recording magnetic data, is used, various types of data, such as date-obtained data, data regarding the location at which an image was obtained, GPS data, degree of importance data, etc. can be recorded on the magnetic recording portion of the film by a camera. Accordingly, when the data obtaining means 1 obtains image data S0 by reading out images recorded on film, by also reading out the data recorded on the magnetic recording portion of the film and attaching said data to image data S0, the representative image selecting means 4 can select the representative images based on the data attached to image data S0, in the same manner as in the embodiment described above.

[0031]

Further, in the embodiment described above, 3 images were attached to the surface 8 of the storage medium 7 as representative images. Alternatively, any number of images may be attached thereto as representative images. All of the images represented by the image data recorded on the storage medium 7 can be attached to the surface 8 of the storage medium 7 as representative images.

[Brief Description of the Drawings]

[Figure 1] is a schematic block diagram of the configuration of the image recording system according to a preferred embodiment of the present invention.

[Figure 2] is a diagram for explaining the selection of representative images.

[Figure 3] is a diagram for explaining the degree of similarity of plurality of sets of image data.

[Figure 4] is a flowchart that illustrates the operation of the embodiment of the present invention.

[Explanation of the Reference Numerals]

1 data obtaining means

2 image processing means

3 image recording means

4 selecting means

5 representative image attaching means

7 storage medium

8 surface

9 representative image

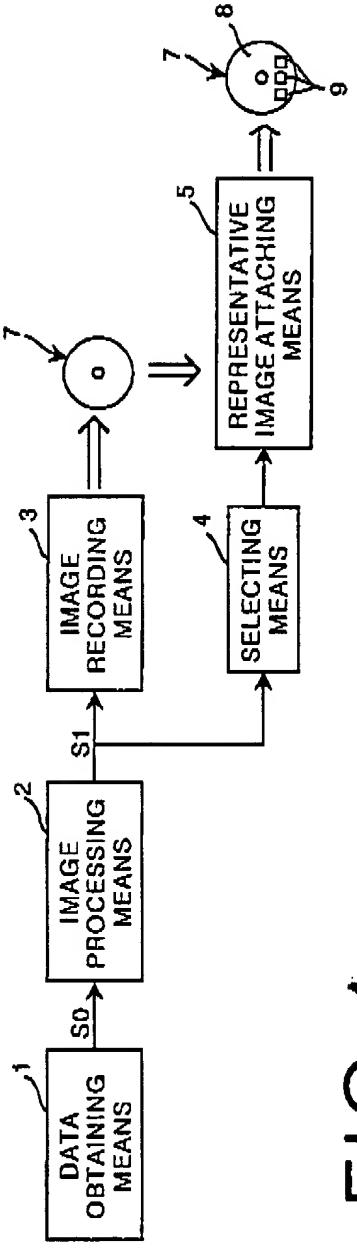

1
DATA OBTAINING MEANS
S0
2
IMAGE PROCESSING MEANS
S1
3
IMAGE RECORDING MEANS
4
SELECTING MEANS
5
REPRESENTATIVE IMAGE ATTACHING MEANS
7
8
9

FIG. 1

FIG.2

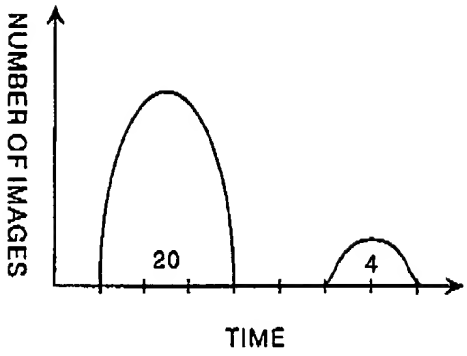


FIG.3

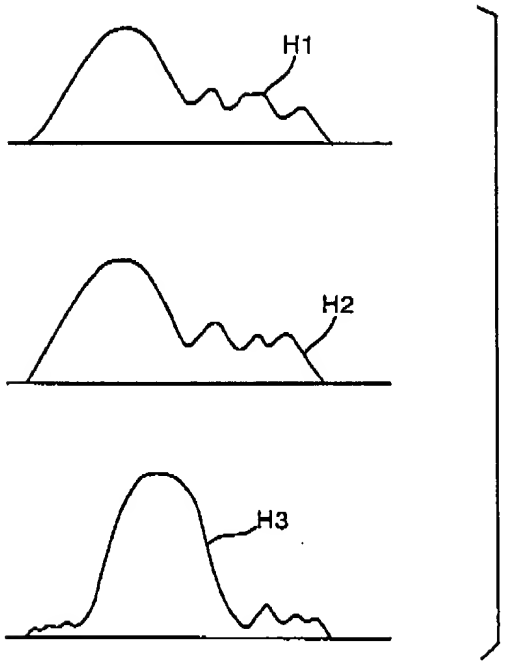
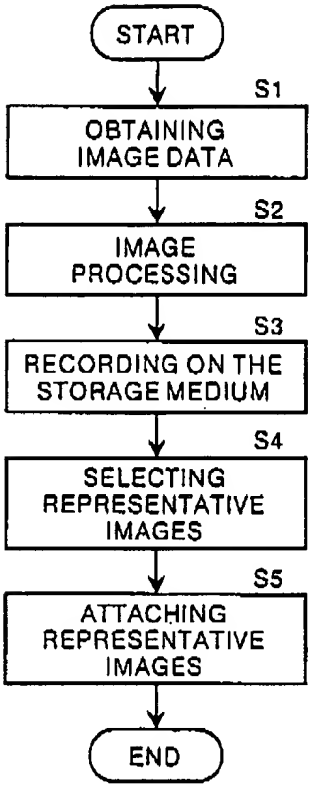


FIG.4


START
S1
OBTAINING IMAGE DATA
S2
IMAGE PROCESSING
S3
RECORDING ON THE STORAGE MEDIUM
S4
SELECTING REPRESENTATIVE IMAGES
S5
ATTACHING REPRESENTATIVE IMAGES
END

[Name of Document] Abstract

[Abstract]

[Objective]

To enable confirmation of the contents of images recorded on storage media, such as CR-R's in a simple manner.

[Constitution]

A data obtaining means 1 obtains a plurality of sets of image data S0 recorded on a data storage medium of a digital camera or the like. An image processing means 2 subjects the obtained image data S0 to image processes and obtains processed image data S1. The processed image data S1 are recorded onto a storage medium 7 such as a CD-R by an image recording means 3. A representative image selecting means 4 selects images representative of the images represented by the image data S1. Then, thumbnail images 9 of the selected representative images are attached to the surface 8 of the storage medium 7 by a representative image attaching means 5.

[Selected Figure] Figure 1

[Name of Document] Abstract

[Abstract]

[Objective]

To enable confirmation of the contents of images recorded on storage media, such as CR-R's in a simple manner.

[Constitution]

A data obtaining means 1 obtains a plurality of sets of image data S0 recorded on a data storage medium of a digital camera or the like. An image processing means 2 subjects the obtained image data S0 to image processes and obtains processed image data S1. The processed image data S1 are recorded onto a storage medium 7 such as a CD-R by an image recording means 3. A representative image selecting means 4 selects images representative of the images represented by the image data S1. Then, thumbnail images 9 of the selected representative images are attached to the surface 8 of the storage medium 7 by a representative image attaching means 5.

[Selected Figure] Figure 1